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ABSTRACT

This document reports the findings of a study group charged with reviewing the current and future prospects for database searching and electronic access to information in the Library of the University of Tennessee at Knoxville. Specific points of interest include factors influencing the demand for these services, costs of providing the services, who should pay, and the possible replacement of print sources with online access to information. Following a discussion of changes in usage patterns, costs, and equipment between 1975 and 1983 and the expansion of the online industry in general, the paper focuses on three major elements of online information service: databases, equipment, and the human factor. The final section of the paper comprises 14 action statements divided into five categories: (1) reallocation of resources; (2) growth of online searching; (3) user charges; (4) document delivery; and (5) impact on reference services. Two appendices--a table showing computer search service use with average search cost from 1975-1983 and suggested guidelines for developing in-house reference query databases--are included, as well as a bibliography. (THC)

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# REPORT OF THE STUDY GROUP ON

# ELECTRONIC ACCESS TO INFORMATION

The charge to this group, consisting of Bob Bassett, Pauline Bayne, Mary Daniel, Sandy Leach, and Lucretia McCulley, was "to review and study the current and future prospects for database searching and electronic access to information." Specific points mentioned in the charge included factors influencing the demand for these services, the costs of providing the services, who should pay for the costs, and the possible replacement of print sources with online access to this information.

Computerized literature searching has been offered to the campus community by the UTK Library since 1975 and has continued to provide student and faculty researchers with quick, effective means to review literature and produce bibliographies in nearly all subject areas. In 1975 the library ran 88 searches using one vendor; by 1983 the library ran 1,696 searches on the following systems: Lockheed Dialog, Bibliographic Retrieval Systems, System Development Corporation, Department of Energy ReCon, National Library of Medicine Medline, and Chemical Abstracts Service structure searching. Contracts with these six vendors provide access to over 200 individual databases. During 1984 we expect to reach 2,000 searches. In the fall of 1984 we will begin offering Search Helper searches in the Undergraduate Library on a cost recovery basis.

The potential for greater use is there should we decide to actively promote the service. Word-of-mouth publicity and demonstrations during bibliographic instruction sessions conducted by subject specialists have maintained a steady but unspectacular growth. Although the availability of personal computers is increasing daily, by advertising the library's service to persons and businesses not affiliated with the university, we may stand to profit from increased revenues. This would, of course, involve enhancing our facilities and expanding the network of searchers to include interested people from all library departments.

In reviewing library literature concerning the introduction of online search services, our experience during the past decade closely parallels that of other academic libraries. In most respects, we can be justly proud of the manner in which the UTK Library has enabled us to integrate these services. It is not without considerable cost, however, that we have accomplished this. Accepting all reference librarians as potential searchers, we recognized from the beginning the importance of adequate training and refresher sessions. In 1983, for example, we spent over $800 for computer time alone for in-house training. During the fiscal year 1983/84, over $1,300 was spent for off-campus meetings and training sessions. The library should anticipate an annual cost of between $1,500-$2,000 in order to keep searchers current with new developments.

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A librarian's time is money, too. In 1983, UTK searchers averaged 42.3 hours of online time and each completed an average of 154 searches. Each search requires at least an hour (sometimes more) of profile time and bookkeeping work. Considering all search service related work, during 1983 each searcher averaged nearly 200 hours, or five 40-hour weeks. These figures do not take into account time spent on promotional activities, search service administration and management, the Search Helper service at UGL, attendance at training sessions and user groups mentioned above, or routine provision of information about the service from the reference desk. Search service activities are carved from the hours not scheduled at the reference desk and must be subtracted from the time which had been devoted to other aspects of reference librarians' work. Hours consumed by search service activities have doubled since 1980.

In 1978 the library significantly upgraded the search service equipment by purchasing three 1200 baud terminals. These allow us to provide immediate printout results at high speed and reduced costs to our users. As satisfactory as these terminals are, however, very promising recent changes in the development of equipment and peripherals have moved our present equipment closer to obsolescence.

The costs outlined above are "hidden" from the user. Currently, we recover all direct costs: online connect time, telecommunications charges, and any citation royalties. The deliberations which moved us from a charging system involving partial subsidy towards recovery of these direct costs were predicted in a 1975 article [1], the year in which the service was introduced on campus. When we dropped the subsidy in 1980, the change in the charge structure gave us greater flexibility in meeting patrons' needs, but it also required increasing the self-confidence of searchers. APPENDIX A shows the number of searches run in each year since 1975 and the average cost per search to the patron. The periodic fluctuations in average costs may be attributed to a number of factors, but increases do correspond to years in which the department added a number of new librarians. Online practice may not make searchers perfect, but it does tend to improve the level of their efficiency.

Within the past two years we have cautiously opened up information packaged in databases to answer reference queries--at no charge to our users. From 1982 through 1983, RQ's increased from an average of 34 to 55 a month, while maintaining a per query cost averaging below $3.50. Funding for this popular service has been provided from the slight margin of fees collected over actual library costs for online bibliographic searches. Based on the rate of growth in the use of RQ's, we cannot expect to carry this service beyond the current fiscal year without additional library funds. For examples of when RQ's are used in reference service, please refer to APPENDIX B.

On the face of it, then, we seem to be doing fairly well in integrating the new information services. Moderate fiscal support has enabled us to experiment and to recommend changes which have enhanced our capabilities from time to time. What has prompted a review of these activities at this particular time? Far-reaching changes have continued to take place in almost every aspect of the information industry while we have been occupied with absorbing the initial effects on libraries of the industry's revolution.

At a conference in December 1981, officials of Knowledge Industry Publications stated that the online part of business information should be the fastest growing industry--148 percent increase from 1980 to 1985. International Resource Development predicted in 1982 that suppliers and distributors of database services would grow roughly from a billion dollar industry in 1981 to one of $5.5 billion by 1991. They now believe that industry revenues will exceed $10 billion by 1994 [2].

It may be helpful to focus on how this enormous, anticipated growth is expected to affect the major elements of online information service: databases, equipment, and the human factor.

## DATABASES

Cuadra Associates lists 2,225 databases and distinct files in the Spring 1984 Directory of Online Databases, which is eighteen percent more than six months earlier. Within the same six months, the number of vendors providing access to these databases increased twenty percent. [3] Presently, the UTK Library has contracts or agreements with fifteen of these 327 vendors. Martha E. Williams of Information Market Indicators, while observing that publicly available databases are increasing at a rate of 20-30% per year, tempers these figures somewhat by reporting that some of the more than 2,000 databases "are very short-lived and most are not used heavily. In fact, within the information center/library market, 80% of all usage is accounted for by only 25 databases." [4].

### Types of Databases

For the most part, our online activities have been with bibliographic databases, the print equivalents of which have been on reference shelves for years. Containing citations or abstracts of printed materials such as newspapers and periodicals, these databases, whether in print or online, tell users where to find the full text of what they want.

Similar to many volumes found in a Ready Reference collection, referral databases are directories listing names of individuals, organizations, or institutions. A prime example is the Encyclopedia of Associations database, which has information on over 15,000 trade associations, professional organizations, labor unions, and so on. An important aspect of all online databases is their currency, and that quality is particularly appreciated in referral databases.

In addition to these reference, or word-oriented, databases, perhaps the greatest potential for information users is in numeric databases. Information in these databases, sometimes referred to as source databases, is often presented as a time-series comprising measurements over time for a given variable. Many of the databases have been developed with specific applications in mind and can be manipulated online to produce charts and graphs, or used in simulation models of statistical analyses, with results displayed at an online terminal. In the introduction to Numeric Databases, [5] these sources are listed in three categories:

1. Numeric databases (original survey data and other statistical data). DISCLOSURE, which extracts reports filed by public owned companies with the U.S. Securities and Exchange Commission; and the BLS Consumer Price Index, which includes time series of consumer price indexes as calculated by the U.S. Bureau of Labor Statistics, are two examples of numeric databases.

2. Textual-numeric databases (records that contain fields of numeric, textual, or both types of data). PTS Prompt is an example of a textual-numeric database. It abstracts information such as market data, production, etc., as it is reported in newspapers, financial reports, and journals.

3. Properties databases (dictionary- and handbook-type data). Examples include CHEMNAME, which lists chemical substances, molecular formulas, etc., and BIOCODES, which included BIOSIS codes and taxonomic codes.

Although the library provides online access to several numeric databases, more numeric data are available in tape format than are presently accessible through vendors. Further, JoAnn Dionne reports that the online database versions "may contain only selected variables." [5, Chapter 12] The University of Tennessee (Knoxville) Computing Center maintains tape copies of the following databases: 1970 and 1980 Censuses, State of Tennessee; Standard and Poor's COMPUSTAT Services; CRSP, Center for Research in Security Prices; and the 1970 Health Interview Survey. Potential users may be referred to consultants in either the UTCC or the Center for Business and Economic Research. In the past, the library had been one of the campus units which shared the costs of obtaining these tapes for the UTCC; because we can anticipate continued demand for these databases, we must remain informed of the resources at the UTCC while exploring cooperative ways with the Center for making these data more readily available.

As the name implies, full text databases, the last type to be considered, provide the complete text of a newspaper item, court decision, journal article, and so on. James Thompson has referred to full text systems as one in a whole array of "data bridges" [6] which provide the necessary connection between the cited source and the actual text itself. Other emerging data bridges, according to Thompson, include document delivery services, facsimile transmission, electronic publishing, videotex systems, and videodiscs.

Indeed, it is through these developing technologies that the library as we know it is about to be most profoundly affected. Lancaster and Smith, [7] writing in 1980, addressed the rate of shift toward electronic publishing:

> So far, electronic publication has had no significant impact in replacing existing print-on-paper publications, but it seems reasonable to assume that a substantial level of replacement will occur within the next decade by 1990. This replacement is likely to affect the indexing and abstracting services first, many types of reference books, and the journal literature somewhat later.

Some journals already exist in co-published forms: print-on-paper form distributed in traditional ways and electronic form available through database vendors. The Harvard Business Review Online as well as the magazines and newspapers available on NEXIS are examples. Information services, such as VU/TEXT, seem to appear weekly offering libraries access to full text databases. At present, many of the publications packaged in these databases are business- and news-oriented. Full texts online of periodicals and newspapers present options to libraries for emphasizing access rather than possession of information.

With the appearance of online counterparts of traditional, printed sources, i.e., the bibliographic databases, libraries began to scrutinize their hard copy subscriptions to infrequently consulted indexes and abstracts. We have already cancelled a few during the various serials reviews, but as a side project, this study group has prepared a cost comparison chart showing typical database searches and paper subscription rates. There may be a few additional titles we ought to consider cancelling, and the chart, too lengthy to be duplicated here, is available for use in collection development reviews considered appropriate by the library administration.

In some instances, the decision to no longer subscribe to the hard copy version is made for us. For example, the Avery Index to Architectural Periodicals, heavily used by students and faculty, has ceased appearing in paper. Additionally, many new databases have never had a counterpart in paper; still others appear for the first time in both formats. In the latter instances, the tendency of libraries is not to subscribe to the print version. All these situations pose new considerations of the library's role as provider of information access.

## EQUIPMENT

Hardware and software developments during the 1980's should have a major impact on the growth of the market for online services:

> Trends indicate that by 1985...one out of six white-collar workers will have a PC at work, and one out of four households will own a PC. Forecasters also predict that by 1990, communication/transaction software will have outdistanced education/entertainment applications. As a result of the growth of a large installed base of information, information services will flourish in the 1990's. [8]

As if in support of these predictions, the lead article in the August 20, 1984, issue of Context reported:

> Knoxville faculty and staff members ordered nearly $50,000 worth of personal computers during the first week of a discount purchase program the University introduced August 7 to promote employee computer literacy. [9]

The library, too, must plan to upgrade its own equipment in order to provide for all its faculty members, as information access specialists, the full advantages of the new personal computers/word processors. Specifically for Search Services, replacing the 1200 baud terminals purchased in 1978 with PC work stations, for example, will enable librarians to pre-format searches before entry into the timed and charged databases.

Another application made possible by the PC is the downloading of data from the mainframe computer, or vendor. Many vendors have contracts forbidding this and have begun to offer as an alternative to downloading the distribution of subset databases formatted on floppy discs. These could be distributed and updated regularly by producers who will maintain control over their database materials. BIOSIS has been experimenting with its own floppy disc service called BITS, whereby users are provided with a permanent, royalty-free license to browse, search, and provide searches within an institution. If costs are comparable or lower than traditional online searching in the future, libraries may want to investigate the possibility of purchasing their own floppy disc collections, especially for high-use databases such as MEDLINE, ERIC, BIOSIS, etc. [10]

Finally, the heightened sophistication of library users should prepare us to expect to receive even more requests for provision of a public access OCLC terminal which would greatly enhance a researcher's ability to check bibliographies and references not in our local database.

## THE HUMAN FACTOR

At the Congressional Copyright and Technology Symposium held earlier this year, Librarian of Congress Daniel Boorstin remarked that society was prone to the "'displacive fallacy'--a belief that every new technology would displace the old one...that television would displace radio, that electronic news would displace print journalism, that the auto would displace the foot.... But the development of technology is not displacive; it is cumulative, and that is what gives interest to what we are concerned with today." [11] Librarians who have been in the profession anytime during the past decade know much about the "cumulative" effects of technology. Not only have they been expected to remain knowledgeable of prior methods, but they have also been propelled into situations in which they are expected to use new technologies expertly. This professional climate will prevail in the decades ahead.

As the intermediaries between information and its users, librarians may expect continually increasing demands on their time as online searchers and as teachers of online search tactics. In the years immediately ahead, it will become evident that we cannot continue indefinitely to access online databases for every user need. As more databases are only available online, we will find ourselves in a situation analogous to restricting the use of bound volumes of indexes and abstracts to librarians. Fortunately for us, the interest of library users in searching on their own is there. The extent to which this will alter library instruction in the future is hinted at in a recent article by Elaine Trzebiatowski reporting on an end user study of BRS/After Dark:

> BRS/After Dark is essentially a modification of the regular BRS system and still demands background knowledge and skill in order to perform a successful search.... The truly user-friendly search system will be an artificially intelligent or knowledge-based system that will be totally interactive and offer online user assistance.... As the population becomes increasingly computer literate and as more libraries obtain online catalogs, users will expect to have access to systems like BRS/After Dark.... Eventually, libraries can anticipate having microcomputers with auto-dial modems in a public access area where end users can perform their own searches. [12]

Approaches such as this promise to free librarians from the repetitiveness of one-on-one assistance in much the same way as present-day bibliographic instruction classes do for printed sources. Developing a program for end user searching depends on the philosophy, funding, and personnel of an individual library. However, libraries must face this new trend and decide how they will proceed to accommodate those interested in conducting their own searches. They must begin to develop educational programs that not only assist interested end users, but that will also instruct all students, staff, and faculty in managing and accessing information in databases.

Meanwhile, the complexities of many databases, particularly the numeric types, create new demands for subject specialization. Returning to JoAnn Dionne, "Reference assistance with numeric databases requires a knowledge of the subject content of the databases and their applications.... The more involved the librarian becomes as an intermediary between the user and the data, the more training is necessary in statistics and programming." [5, Chapter 12] So, the more we change, the more we remain the same. Libraries will continue to need both "generalists" and "specialists," and more often than not, these characteristics will be contained in each individual.

In the decade immediately ahead, how are we to assimilate these projected changes in databases, equipment, and personnel, while maintaining the traditional modes of information (books, journals, non-print materials, etc.) and current library services? In order to keep up with the changing information environment, libraries must shift their emphasis from collections to access. Our principal goal and activity must become more user conscious by providing easier access to information. Richard DeGennaro states clearly that "those who use libraries, and those who provide their financial support must recognize and accept this new reality. The explosion in quantity, cost, and communicability of information is a new phenomenon which calls for new responses....The pattern of expenditures will change and an increasing proportion of the library budget will go for new technology and access services. The acquisitions budget must be increased substantially and its function expanded to include acquiring and providing access to collections of information in electronic form. [13]

Libraries will have to rely increasingly on the collections and services of other libraries through networks, consortia, cooperative collection development, and electronic communications. Document delivery is a problem heightened as the search service volume increases. Relevant documents are identified through a fast and efficient online search, but when the library does not own the document or cannot provide it quickly, then the benefits of the search are reduced. Already, interlibrary loan delivery times have been reduced from weeks to days due to the widespread use of computer access to national databases (OCLC and RLG). Even as this is being written, Federal Express is advertising its ZAP Mail which will deliver any document in the country in a matter of two hours. Delivery times may be reduced to a matter of minutes before the end of this decade. [13] Again, however, the electronic delivery of a wide range of books and journals that the library does not own or cannot acquire, will require additional and more highly skilled technical staff and will require funding for the new equipment that will speed up the process.

This report concludes with a series of ACTION STATEMENTS which the Committee believes should be useful in guiding the direction of the library in the years immediately ahead.

## ACTION STATEMENTS

Within the next ten to twenty years, a new library/information environment will evolve which will require a new understanding of the reference process. "This anticipated environment will be without attendant surrogates (books, journals)--an environment containing only information. Present practices of document ordering and delivery of facsimiles will give way to data transmission requested from full-text databases." [8] Collection policies, service policies, practices, and roles will have to change. Therefore, it is important to consider the following action statements for implementation today, but it is equally important to reconsider them on a regular schedule so that new responses may be made as conditions change.

### Reallocation of Resources

1. The Library should frame new goals and objectives relative to information access in order to present funding needs to campus administrators. Such statements might relate to reallocation of resources from acquisition to access: "Continue to strengthen the library's own book and journal collections while also developing its capacity to provide access to scholarly resources elsewhere both in traditional and electronic forms." [13]

### Growth of Online Searching

2. It is critical to determine how much staff is required for a particular volume of service and how much equipment is needed to support that staff.

## Growth of Online Searching (continued)

3. Training of new staff and continuing training for new sources or new features will be an ongoing need. The cost for such training will increase and must be regularly budgeted.

4. New equipment alternatives should be explored. Microcomputers will be of great assistance in support of the search service, for saving search strategies and results, for tailoring results, etc. Their purchase should be planned and budgeted. New electronic means of document delivery (facsimile transfer) should also be explored.

## User Charges

5. When secondary sources are available in both database and print formats, the print version should be considered for cancellation. Such cancellation should by no means be automatic, but evaluated on a title-by-title basis, weighing the following factors:

   --types of use
   --volume of use
   --cost of print version
   --possibility of free searching of database
   --ease/difficulty of manual searching vs. new kinds of access through electronic searching.

6. When the database index is the only available format or when the Library cancels a print index in favor of the electronic form, free searching on that database should be considered.

7. For any new index available in print form, the first action in considering a subscription should be to determine if it is available online.

8. Explore alternative funding sources for database searching, such as departmental funding for graduates and undergraduates when searching is required for a class-related assignment, or other sources of subsidies.

9. Library faculty should have access to computer searching in support of their own work (both departmental and committee information gathering and library research) without cost. Such searching is available now only in certain instances to administrators and committees, but should be regarded as a decision-support tool for any Library faculty member.

10. Ready reference use of electronic databases should remain free to the user, and access should rest upon the judgment of individual librarians.

## Document Delivery

11. The UTK Library should explore better means of document delivery when we do not own sources cited in searches for users. This need becomes increasingly critical as the volume of searches increases, as new journals are published but cannot be purchased, etc.

    --Actively foster cooperation by fostering a state/regional ILS network, retaining CRL membership, etc.
    --Explore means of providing electronic document delivery.

## Impact on Reference Services

12. Numeric databases, not available through vendors, should be available to the Library Search Service. We need to identify the availability of these and other databases on campus to be able to refer users, to avoid duplication, and to consider both shared purchase and use.

13. End-user searching in the Library.

    --Given today's resources, the Library probably could meet this demand only with equipment stations. All other costs would have to be borne by the user, and training of users would not be feasible at present.
    --It is important to monitor changing needs in this area as microcomputers become more available to all campus users.

14. Bibliographic instruction impact.

    --Reference librarians, as skilled searchers and experts on databases, should become the teaching resource for university students, who will need to develop skills in information retrieval and management. The Library should inform campus administrators and the faculty of this potential role.

September 6, 1984

APPENDIX A

## COMPUTER SEARCH SERVICE USE AND COST

| Total Searches | | Average Search Cost | |
|---|---|---|---|
| 1983 | 1,696 | 1983 | $ 14.28 |
| 1982 | 1,229 | 1982 | 12.01 |
| 1981 | 1,027 | 1981 | 12.04 |
| 1980 | 815 | 1980 | 12.81 |
| 1979 | 524 | 1979 | 14.73 |
| 1978 | 270 | 1978 | 15.59 |
| 1977 | 210 | 1977 | 14.81 |
| 1976 | 256 | 1976 | 12.06 |
| 1975 | 88 | 1975 | 13.42 |

APPENDIX B

## SUGGESTED GUIDELINES FOR RQ'S

1. Hot topics. Librarians will identify a few topics each quarter about which many users are likely to request information. Searches on these topics will be kept in folders at the reference desk. These searches will be provided for student use in exchange for ID cards.

2. Currency. Searches will be run for identification of citations and information too current to appear in printed indexes. These printouts will be kept on file near the terminal, organized for easy access and identification of questions.

3. Verification. Searches will be run to help librariuns identify incomplete or incorrect citations.

4. Reference. Searches will be run for specific information, especially that which can be expressed by uniquely identifiable words or phrases. These searches may be used to identify starting points for further manual searching.

5. Branch libraries. Searches will be run in the above categories for branch libraries with no online access.

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Citations from which quotations were taken are numbered below; following these, in alphabetical order, are articles and books which also were found to be particularly helpful in developing this report. Unfortunately, nothing in the literature delineated specific guidelines for fee-structuring these new services. Even the best overview articles by Battin, De Gennaro (LJ, June 15, 1984), and Thompson, agree only that libraries must maintain traditional collections and services even while adopting the newer technologies. Perhaps the best introduction available to the area of financing online services is Lynch's 1981 ALA survey in which the two factors cited most frequently by participating libraries as determining their policies were the "Level of funding available," and the "Need for a simple system."


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